

LOL-HECO-IR-58

Ref: Expert Qualifications of HECO Witness Stewart, HECO-500

Question(s):

- a. In which subject matter fields does HECO plan to have the witness be qualified as an expert witness?
- b. In which subject matter fields does HECO plan to have the witness testify as a lay witness?
- c. For the expert witness, in their area of expertise, please provide answers to items (c)1-6, as listed below. Wherever possible, please provide the answer either in electronic format or by providing a web address where the document(s) can be down-loaded.
  1. All articles, books, chapters, or other documents written in whole or in part by the witness. Please provide the date of publication or release, the agency it was submitted to, the docket and/or file number that contains the document. Please provide electronic copies of all documents if they exist. Please provide the location of hard copies (source, cost, docket number, file number, or other identification).
  2. All courses taken, degrees given, courses/classes taught by the witness. Please provide electronic copies of all documents if they exist. Please provide the location of hard copies (source, cost, docket number, file number, or other identification).
  3. All presentations, testimonies, talks made and exhibits submitted by the witness to regulatory agencies. Please provide electronic copies of all documents if they exist. Please provide the location of hard copies (source, cost, docket number, file number, or other identification).
  4. All projects overseen by the witness. Please include the dates of participation and any identifying characteristics of the project necessary to track down information about it. Please provide electronic copies of all documents if they exist. Please provide the location of hard copies (source, cost, docket number, file number, or other identification).
  5. All correspondence between the witness and HECO with regard to their testimony. Please provide electronic copies of all documents if they exist. Please provide the location of hard copies (source, cost, docket number, file number, or other identification).
  6. All reports, draft or otherwise, submitted by the witness to the utility. Please provide electronic copies of all documents if they exist. Please provide the location of hard copies (source, cost, docket number, file number, or other identification).

HECO Response:

- a. In general, Mr. Stewart will testify as a witness on HECO's behalf in the area of overhead transmission line maintenance, including live working (LW). The Hawaii Public Utilities Commission generally does not require that a witness be recognized as an "expert witness" in a particular area or subject. The Commission will give the appropriate consideration to a testimony based on its merit.
- b. See the response to subpart a.
- c.
  1. HECO objects to the request, as unduly burdensome, onerous and overly broad to the extent that it requests "[a]ll articles, books, chapters, or other documents written in whole or in part by the witness." The request for "[a]ll articles, books, chapters, or other documents written in whole or in part by the witness" could be construed to request documents written in whole or in part by the witness even if such documents were not related to the subject matter addressed by the witness or even if the document is not related in any way to the electric utility industry. Without waiving any objections, HECO provides the following response.

A list of representative publications and presentations authored and co-authored by Mr. Stewart is attached as pages 24-36.

2. HECO objects to the request, as unduly burdensome, onerous and overly broad to the extent that it requests "[a]ll courses taken". The request is unduly burdensome, onerous and overly broad, because the request for "[a]ll courses taken" could be construed to include "courses" going all the way back to college. It would be unduly burdensome and onerous, as well as counterproductive for the witness to have to identify the "courses"

taken going back to college. Without waiving any objections, please see the following response.

See Mr. Stewart's resume attached as pages 7-36.

3. HECO objects to the request, as unduly burdensome, onerous and overly broad to the extent that it requests "[a]ll presentations, testimonies, talks made and exhibits submitted by the witness to regulatory agencies." The request is unduly burdensome, onerous and overly broad, because it could be construed to encompass numerous materials. Without waiving any objections, please see the following response.

A list of representative publications and presentations authored and co-authored by Mr. Stewart is attached as pages 24-36.

4. It would be unduly burdensome to list all the projects overseen by Mr. Stewart. See pages 8-24 of the attached resume.
- 5-6. HECO objects to providing copies of "[a]ll correspondence between the witness and HECO with regard to their testimony" and "[a]ll reports, draft or otherwise, submitted by the witness to the utility". The request for "[a]ll correspondence between the witness and HECO with regard to their testimony" includes various e-mails and attachments to the e-mails. HECO objects to providing the requested correspondence, as these documents are privileged and confidential and should not be provided on public policy grounds. In the correspondence between HECO and the witness, the discussions are brief since HECO personnel and the witness understand the context of the subject matter and HECO believes that it is not cost effective to spend the time to generate elaborate discussion on the subject matter. If HECO is required to produce such correspondence between HECO and the witness, then the information would have to be

generated in a fashion suitable for external publication, rather than in its present form (which is suitable for HECO's discussions with the witness). This would be unduly burdensome and onerous, as well as counterproductive.

The correspondence between HECO and the witness are solely intended to be a tool to communicate information between HECO and the witness. The correspondence are an integral part of the decision making process in which thoughts are expressed, which may not be reflected in the written testimony. In addition, documents such as drafts of testimony, which are attached to e-mails, are a necessary step in the decision making process and can result in candid dialogue. Were these documents subject to review by others in a regulatory proceeding, their candid nature and, therefore, their value could diminish significantly in the future, and HECO's communications with its witnesses and decision-making process would be seriously hampered.

This information request basically requests unlimited access to HECO's correspondence with HECO's witness related to the testimony. This information request fails to balance the need for the information against HECO's need to manage. For example, the Federal Freedom of Information Act ("FFIA"), codified at 5 U.S.C. §552, and the Uniform Information Practices Act (Modified), codified at H.R.S. Ch. 92F, contain broad disclosure requirements based on the public's interest in open government. However, even such broad disclosure acts provide exceptions from the broad disclosure requirements that are intended to permit the efficient and effective functioning of government. It is common in such acts to protect from disclosure pre-decisional agency memoranda and notes, and/or government records that, by their nature, must be confidential in order to avoid the frustration of a legitimate government

function. This is similar to the “deliberative process privilege” recognized by the Pennsylvania Public Utility Commission with respect to its own internal staff reports. See Pennsylvania Public Utility Commission v. West Penn Power Company, 73 PA PUC 122 (July 20, 1990), West Law Slip Op.

In addition, the request is overly broad or at least could be construed in that fashion, and HECO objects to the request on such grounds. The request is overly broad, because it applies to correspondence related to drafts of testimony being prepared for this proceeding, and questions or comments from HECO’s attorneys related to the testimony. HECO objects to providing correspondence related to drafts of testimony on the grounds stated above, regardless of whether such correspondence relates or reflects privileged communications with attorneys or attorney-work product. To the extent the request asks for communications that may contain the mental impressions, conclusions, opinions, or legal theories of HECO’s attorneys (e.g., some attachments to e-mails include the mental impressions and conclusions of HECO’s attorneys on drafts of testimony), HECO further objects to such request on the grounds that it asks for documents that are protected by the attorney-client privilege and the attorney work-product doctrine.

HECO objects to the request for “drafts” of “[a]ll reports . . . submitted by the witness to the utility” on the grounds stated above regarding drafts of testimony.

HECO also objects to disclosure of such requested correspondence and draft reports even under a protective order. The value of the correspondence (including the attachments) with a witness and draft reports will be diminished if HECO is required to

provide such documents, even if documents were provided pursuant to a protective order.

## **BIOGRAPHICAL SUMMARY OF ANDREW H. STEWART**

President  
EDM International, Inc.  
4001 Automation Way  
Fort Collins, Colorado 80525  
(970) 204-4001  
astewart@edmlink.com

### EDUCATION:

M.S. - Civil Engineering (Structures), Colorado State University, 1984  
B.S. - Civil Engineering, University of Rhode Island, 1981

### AWARDS AND HONOR SOCIETIES:

Sigma Xi - National Scientific Research Honor Society, University of Rhode Island  
Engineering Excellence Award - May 1981; Tau Beta Pi - National Engineering  
Society; Phi Kappa Phi - National Honor Society; Dean's List (all semesters).

### PROFESSIONAL ORGANIZATIONS:

American Institute of Steel Construction (AISC)  
American Society of Civil Engineers (ASCE)  
American Society for Testing and Materials (ASTM)  
Institute of Electrical and Electronics Engineers (IEEE)  
Chairman of the IEEE Working Group on the Management of Existing  
Overhead Transmission Lines (2001-Present)

### PATENTS:

"Cable Tensioning Device," 5,454,272, 10/3/95.  
"Apparatus and Method for Monitoring a Cable," 09/923,256, pending.

### EXPERIENCE:

#### Teaching:

Affiliate Faculty, Department of Forest and Wood Sciences, Colorado State  
University, 1987 - 1997.  
Instructor, Civil Engineering, Colorado State University, 1983 - 1985.

#### Research and Consulting:

President, EDM International, Inc., 1998 – Present.  
Director, Barlow Projects, Inc., 2000 – Present.

Director, Intec Services, Inc., 1997 – Present.  
President and Chairman, Intec Services, Inc., 1992 – 1997.  
Vice President of Engineering, Lignum Corporation, 1991-1996.  
Director of Engineering, Engineering Data Management, Inc., 1985 – 1997.  
Project Manager, Engineering Data Management, Inc., 1984 - 1985.  
Senior Engineer, Engineering Data Management, Inc., 1983 - 1984.  
Graduate Research Assistant, Colorado State University, 1982 - 1983.

**Representative Projects:**

(Involved in the following projects as project manager/principal investigator (PM) or participant/researcher (P)).

1. "Application of Nondestructive Evaluation Techniques for Detecting Below Grade Corrosion Lattice Tower Members." EPRI Solutions. Ongoing: 2001-Present. (P).
2. "Assessment of Wood Pole Management Practices." EPRI. Ongoing: 2003-Present. (P).
3. "Bird Strike Indicator/Bird Activity Monitoring System." EPRI. Ongoing: 2000-Present. (P).
4. "Conductor Cooling Technology." EDM Internal R&D. Ongoing: 2003-Present. (PM).
5. "Corona Testing – Devices to Mitigate Bird Collisions." Santa Cruz Predatory Bird Research Group. Ongoing: 2003-Present. (P).
6. "Transmission Line Inspection and Maintenance Software Integration Plan and Implementation." Xcel Energy - Northern States Power Company, Minnesota. Ongoing: 2002-Present. (P).
7. "Development of an Asset Management Plan for Overhead Lines." Snohomish County Public Utility District. Ongoing: 2003-Present. (PM).
8. "Development of Concepts for NCI Inspection." EPRI. Ongoing: 2000-Present. (P).
9. "Development of Tool to Determine the Condition of NCI by Evaluating the Vibration Characteristics Using a Contact Method." Southwest Research Institute. Ongoing: 2003-Present. (P).
10. "Enhance and Expand Availability Performance Monitoring System." California ISO. Ongoing: 2000-Present. (PM)



11. "Enhancement of NDE Techniques for Detecting Below Grade Corrosion of Anchor Rods." EPRI Solutions, Inc. Ongoing: 2001-Present. (P).
12. "EPRI AC Transmission Line Reference Book – Chapter 13: Designing for Maintainability." EPRI. Ongoing: 2001-Present. (PM).
13. "EPRI-Inspection and Assessment Methods Initiative Activities." EPRI. Ongoing: 2004-Present. (PM).
14. "Feasibility Study: Mutual Inductance Bridge (MIB) Based Inspection System for Detecting Conductor Core Corrosion." EPRI. Ongoing: 2003-Present. (PM).
15. "Feasibility Study: Spectrometry-based Systems for Detecting Evidence of Conductor Core Corrosion." EPRI. Ongoing: 2003-Present. (PM).
16. "Hawaiian Electric Company, Inc.-Kamoku-Pukele 138 kV Transmission Line Project, Hawaiian PUC Proceedings." Goodsill, Anderson, Quinn, & Stifel. Ongoing: 2002-Present. (PM).
17. "Inspection and Pole Testing Programs." Xcel Energy. Ongoing: 2003-Present. (PM).
18. "IR and Corona Baseline Measurement of the Hawaiian Electric Company Overhead Line Transmission Grid." Hawaiian Electric Company. Ongoing: 2004-Present. (PM).
19. "Longitudinal Load Testing of Deadend Arms." Powertrusion 2000 International, Inc. Ongoing: 2003-Present. (P).
20. "Managing Transmission Line Steel Structures, Version 2." EPRI. Ongoing: 2004-Present. (P).
21. "Modification of Existing INDEX Application to Accommodate Intrusive Inspection Data Collection." Xcel Energy. Ongoing: 2002- Present. (P).
22. "Omega Power Systems – Phase Tracker Development." Avistar. Ongoing: 2001-Present. (PM).
23. "Phase Identification Technology Demonstration." Consolidated Edison Company of New York. Ongoing: 2002-Present. (PM).
24. "Reliability-Centered Wood Pole Management Programs." More than twenty U.S. and Canadian Electric Utilities. Ongoing: 1987-Present. (PM).
25. "System for Real-time Monitoring of Conductor Ground Clearance." EPRI. Ongoing: 1998-Present. (PM).

26. "T & D Structure Design Software Development." In-house. Ongoing: 1990-Present. (PM).
27. "Technical Support Service for Southern California Edison's Deteriorated Pole Program." Southern California Edison Company. Ongoing: 2004-Present. (P).
28. "Wood Pole Inspection and Maintenance Workshops." Ongoing: 1990-Present. (PM).
29. "Wood Pole Repair Method Study." EPRI. Ongoing: 2003-Present. (P).
30. "Woodpecker Repellent Research Project." Consortium of U.S. Utilities. Ongoing: 2001-Present. (P).
31. "Assessment of the Condition and Life of Austin Energy's 138 kV Post and Suspension Polymer Insulators." Power Engineers. 2004. (PM).
32. "BC Hydro 500 kV Line Rating Study." EPRI Solutions, Inc. 2001-2004. (P).
33. "Development of a Real Time Monitoring System for Overhead Lines." Californian Energy Commission. 1998-2004. (PM).
34. "Rodent Caused Outage Mitigation Research." Tennessee Valley Authority. Ongoing: 2004. (P).
35. "Transmission Line Inspection Workshop for Austin Energy." Power Engineers.: 2004. (PM).
36. "Deployment of Systems and Analysis of Data for Monitoring and Improving Ratings of Overhead Transmission Lines for Southern Company." Southern Company/EPRI. 1999-2003. (PM).
37. "Arizona Public Service/Salt River Project – Joint Cost Saving Initiative," Power Engineers. 2003. (P).
38. "Deployment of Transmission Line Condition Data Collection Reconnaissance System for Iraq." Power Engineers. 2003. (P).
39. "Evaluation of the Applicability and Practicability of Live Working (LW) Methods  
40. for Hawaiian Electric Company, Inc.'s (HECO) 138 kV Transmission System." Hawaiian Electric Company. 2002-2003. (PM).
41. "Developing Case Study Roadmaps for Electric Utility Asset Management Programs." EPRI. 2002-2003. (PM).

42. "FRP Crossarm Testing." Geotek. 2003. (P)
43. "GIS Strategic Plan." Platte River Power Authority. 2002-2003. (P).
44. "Mitigation of Animal Caused Outages." EPRI. 1998-2003. (P).
45. "Pole Test and Wood Pole Inspection Training." Newfoundland and Labrador Hydro. 2003. (P).
46. "Evaluation of the Adequacy of Oncor H-Frame Transmission Structures for Line Upgrade." Power Engineers. 2002. (PM).
47. "Evaluation of Conductor Corrosion." Power Engineers. 2002. (PM).
48. "Animal-Caused Outage Mitigation Workshops." Consolidated Edison Company of New York. 2002. (P).
49. "ASCE/SEI Electrical Transmission in a New Age Conference – Conference Committee." 2002. (P)
50. "Assistance with the Development of the GIS-driven Transmission Asset Management Information System." Power Engineers/Public Service Company of New Mexico. 1999-2002. (P).
51. "Crossarm-Connection Testing and Capacity Assessment." San Diego Gas and Electric. 2001-2002. (P).
52. "Deployment of Systems and Analysis of Data for Monitoring and Improving Ratings of Overhead Transmission Lines for Commonwealth Edison." Commonwealth Edison/EPRI. 1999-2002. (PM).
53. "Development of Guyed Structure Analysis Routine for Access® Loading Program." Southern California Edison Company. 2001-2002. (P).
54. "Development of Improved Meteorological Data for the Rating of Overhead Transmission Lines." Omaha Public Power District. 1998-2002. (P).
55. "Development of Systems and Analysis of Data for Improved Rating Methods." EPRI. 2002. (P).
56. "Otero Pumping Station Expansion Project." City of Colorado Springs, Colorado. 2002. (P).

57. "Research and Testing on the Performance of Manufactured Housing Under Lateral Wind Loads. 1994-2002. (PM).
58. "Slow Release Fungicides for Wood Pole Applications." Electric Power Research Institute. 1992-2002. (PM).
59. "Specification Review for MS-454." Southern California Edison Company. 2002. (P).
60. "Transmission Line Availability Analysis for the Australian Competition and Consumer Commission." Power Engineers. 2002. (PM).
61. "Ultrasonic Analysis of Anchor Rods." New York Power Authority. 2002. (P).
62. "Wood Procurement Specification Review." Snohomish County Public Utility District. 2002. (P).
63. "California Power Industry Review." Newmark International, Inc. 2001. (PM).
64. "Deployment of Systems and Analysis of Data for Monitoring and Improving Ratings of Overhead Transmission Lines for Tennessee Valley Authority." Tennessee Valley Authority/EPRI. 1999-2001. (PM).
65. "Inspection of Belton-South Temple Transmission Line." Power Engineers. 2000-2001. (P).
66. "Inspection and Structural Reliability Assessment of Distribution Lines." NORWEB. 1997-2001. (P).
67. "Investigation of Alternative Treatments for Wood Poles." Snohomish County Public Utility District. 2000- 2001. (PM).
68. "Monk Parakeet Study." Reliant Energy/Houston Light and Power. 2001. (P).
69. "Y-ball Failure Metallurgical Investigation." Public Service Company of New Mexico. 2001. (PM).
70. "Development of Generation Availability Performance Measure." California ISO, 2001. (PM).
71. "Review of Inspection Practices." Snohomish County Public Utility District. 2000- 2001. (P).
72. "Williston-Garrison Fire Investigation." Western Area Power Administration. 2001. (P).

73. "Woodpecker Barrier Investigation." Reliant Energy/Houston Light and Power. 2001. (P).
74. "Development and Enhancement of Availability Performance Monitoring System." California ISO. 1997-2000. (PM).
75. "Development of a System for Monitoring Conductor Ground Clearance/Sag." EPRI. 1997-2000. (PM).
76. "Development of a Unified Approach to Wood Pole Facilities Management." New Century Energies. 1998-2000. (PM).
77. "Development of ASTM Standard for Timber Piles." American Wood Preservers Institute. 1998-2000. (P).
78. "Development of Design Wind Loads for San Diego Gas and Electric's Rainbow Valley 500 kV Transmission Line." Power Engineers. 2000. (PM).
79. "Development of Distribution Pole Procurement Specifications." Southern California Edison Company. 1999-2000. (P).
80. "Inspection and Maintenance Training." Public Service Company of New Mexico. 2000. (P).
81. "Line Rating Studies and Equipment Deployment." EPRI. 2000. (P).
82. "Pilot Inspection and Maintenance Assessment of Elster Overhead Facility." Southern California Edison Company. 1999-2000. (P).
83. "Pole Failure Engineering Analysis." Southern California Edison Company. 2000. (P).
84. "Structural Failure Investigation of 115 kV Wood H-Frame." Western Area Power Administration. 2000. (P).
85. "Woodpecker Deterrent Study." Reliant Energy/Houston Light and Power. 1999-2000. (P).
86. "Transmission Line Maintenance Prioritization/Planning." Allegheny Power. 1999. (PM).
87. "Analysis of Pole Reinforcement Market." Glasforms, Inc. 1999. (P).
88. "Cooling Tower Structural Analysis and Life Assessment." Cinergy Corporation. 1998-1999. (P).

89. "Development and Implementation of a G.O. 165 Compliance Plan. Bear Valley Electric. 1999. (P).
90. "Development of a Fumigant Delivery System for Railroad Cross Ties." Union Pacific Railroad. 1994-1999. (P).
91. "Forensic Analyses of the Cause of the Texas A&M Bonfire." 1999. (P).
92. "Ultrasonic Inspection Georgia Power Anchor Rods." Georgia Power Company/Electric Power Research Institute. 1997-1999. (P).
93. Weather Models for Line Rating – Omaha Public Power District. Power Engineers. 1999. (P).
94. "Competitive Products Research Program Workshop." American Wood Preservers Institute. 1998. (PM).
95. "Development of Inspection, Maintenance, Repair and Replacement Standards." California ISO Restructuring Trust. 1997-1998. (PM).
96. "Development of an Innovative Concrete Material." Composite Industries of America. 1997-1998. (P).
97. "Assessment of the Feasibility of Using Various Sensor Technologies for Ground Clearance/Sag Monitoring." Electric Power Research Institute. 1997-1998. (PM).
98. "Utility Pole Market Survey." Hollow Veneer Pole, LLC. 1998. (P).
99. "Assessment of Mid American Energy Company's Transmission Line Design and Construction Practices." Mid American Energy Company. 1998. (P).
100. "Development of Guidelines for the Maintenance of Severely Checked Douglas-fir Poles." Nebraska Public Power District. 1998. (PM).
101. "Assessment of the Implications of Utilizing Grade C Construction." Portland General Electric Company. 1997-1998. (P).
102. "Structural Reliability Assessment of 230 and 345kV Transmission Lines." Public Service Company of New Mexico. 1997-1998. (P).
103. "Transmission Line Uprating Studies for Public Service Company of New Mexico." Power Engineers. 1997-1998. (PM).
104. "Assessment of the Effectiveness of Groundline Preservative Pastes/Wraps on Douglas-fir Poles." San Diego Gas and Electric Company. 1997-1998. (PM).

105. "Review of Specifications for Pole Manufacturing, Inspection, and Treatment." San Diego Gas and Electric Company. 1997-1998. (PM).
106. "Development of Engineering Inspection and Assessment Procedures for Marginal Poles." San Diego Gas and Electric Company. 1997-1998. (PM).
107. "Structural Design for the Pope-Douglas Burner Retrofit." The Barlow Group. 1997-1998. (PM).
108. "Development of Methodology for the Inspection and Assessment of Overhead Transmission Lines." Electric Power Research Institute. 1995-1998. (PM).
109. "Utility Pole Market Analysis." West Coast Engineering. 1998. (P).
110. "Billings-Denver Fiber Optic Project Support Services." Harp Engineering, Inc. 1996-1997. (P).
111. "Seminar on Utility Line Inspection and Maintenance." Queensland University of Technology. 1997. (PM).
112. "Development of a Nondestructive Evaluation Method for Detecting Corrosion on Anchor Rods." Montana Power Company/Electric Power Research Institute. 1995-1997. (PM).
113. "Lateral Load Testing of Manufactured Housing." National Science Foundation. 1994-1997. (PM).
114. "Evaluation of the Wood Pole Antenna Supports in the Sonobouy Training System." Autec Range Services. 1996. (P).
115. "El Paso Electric Transmission Line Assessments." Power Engineers. 1996. (P).
116. "Workshop on Mitigation of Woodpecker Damage to Overhead Utility Lines." Electric Power Research Institute. 1996. (PM).
117. "Data Analysis, Modeling, and Poletest Algorithm Development." IPEC, Ltd. 1996. (P).
118. "161kV System Integrity Program – Inspection and Assessment of the Kerr A Transmission Line." Montana Power Company. 1996. (P).
119. "Nebraska Public Power District:: Pauline-Moore 345kV Line Step Bolt Failure Investigation." Power Engineers. 1996. (PM).

120. "Evaluation of Woodpecker Damaged Poles in the Ojo-Taos 345kV Line." Plains Electric G&T Cooperative. 1996. (P).
121. "Manufactured Pole Technology Assessment." San Diego Gas and Electric/Electric Power Research Institute. 1996. (PM).
122. "Development of Program for Forecasting Transmission Line Maintenance." Oklahoma Gas and Electric Services Company. 1995 -1996. (PM).
123. "Development of Requirements for Software for the Inspection of Overhead Transmission Lines." Electric Power Research Institute. 1995-1996. (PM).
124. "Weather Modeling for Alaska Power Authority's Tyee Lake Transmission Line Improvement Project." Power Engineers. 1995-1996. (P).
125. "Development of Utility Structures Report Series." Western Wood Preservers Institute." 1995-1996. (PM).
126. "Transmission Line Assessment and Inspection Methods – Part I: Field Experiment, Part II: Assessment of Gaps in Inspection Technology." Electric Power Research Institute. 1994-1996. (PM).
127. "Development of a Prototype Sonic Sag Tensioner." IHS, Inc. 1994-1996. (P).
128. "Utility Line Inspection and Assessment for the City of Austin." Power Engineers. 1994-1996. (P).
129. "Inspection, Testing and Evaluation of the City of San Antonio Public Service Transmission System." Power Engineers. 1994-1996. (PM).
130. "Fiberglass Utility Pole Development and Testing." Shakespeare Products Group. 1994-1996. (P).
131. "Development of Waste Wood Recycling Methods." Lignum Corporation. 1991 - 1996. (PM).
132. "Value Assessment of a Wood Pole Distribution System." CH2M Hill. 1995. (P).
133. "Assessment of the Feasibility of Adding Fiber Optics to Existing Utility Lines." City of Austin. 1994-1995. (PM).
134. "Inspection and Evaluation of the PJM East Pole Bypass." Consolidated Edison Company. 1995. (P).



135. "Evaluation of the Integrity of Portland General Electric's Wood Pole Distribution System." ECSI. 1995. (P).
136. "Pilot Study on the Application of Reliability Centered Maintenance to Transmission Lines." Electric Power Research Institute. 1995. (PM).
137. "Verification Testing of a Fiberglass Restoration System for Wood Poles." Hexcel Fyfe Corporation. 1995. (P).
138. "Utility Line Inspection Audit and Specification Development." Houston Lighting and Power Company. 1995. (P).
139. "Wood Pole Market Research." J. H. Baxter & Company. 1995. (P).
140. "Colstrip to Townsend 500kV Line Cathodic Protection Tests." Montana Power Company. 1995. (P).
141. "System Integrity Program Support Services." Montana Power Company. 1995. (P).
142. "Development of a 10-Year Transmission Line Inspection Program." Montana Power Company. 1995. (P).
143. "Improvement of Transmission Line Assessment and Inspection Methods – Field Experiment." Nebraska Public Power District/Electric Power Research Institute. 1994-1995. (PM).
144. "Assessment of the Use of Digital Photography for Enhancing Transmission Line Maintenance." Idaho Power Company/Electric Power Research Institute. 1994-1995. (PM).
145. "Addition of Fiber Optics to the Laurel to Billings Line." TRI Touch America. 1995. (P).
146. "Great Falls 230kV Fiber Project." TRI Touch America. 1995. (P).
147. "Structural Analysis and Testing of Lattice Towers from the Helena to Great Falls Line." Montana Power Company/Electric Power Research Institute. 1995. (PM).
148. "Analysis of Mid River's Structures." Harp Line Constructors Company. 1995. (P).
149. "In Situ Destructive Testing of 115kV H-Frame Structures." Nebraska Public Power District. 1995. (PM).

150. "Development and Testing of the Hardcore-Dupont Pole Reinforcement System." San Diego Gas and Electric Company." 1995. (PM).
151. "Evaluation of the Integrity of Wood Poles for the City of Safford Arizona." Taylor Engineering. 1995. (P).
152. "Review of Transmission Line Inspection Program." Tennessee Valley Authority. 1995. (PM).
153. "Full-Scale Destructive Tests of H-frame Structures." Wisconsin Power and Light. 1995. (P).
154. "Survey on the Use of Distribution Utility Poles." Valmont Industries. 1994-1995.
155. (PM).
156. "Development of a Database for Wood Pole Management." West Plains Energy. 1994-1995. (P).
157. "Utility Assistance and Wood Pole Utility Structure Mini Seminar Program." Western Wood Preservers Institute. 1988-1995. (PM).
158. "Structural Analysis of Wood Pole Utility Line Structures." ASEC. 1994. (P).
159. "Reliability and Risk Assessment of the Wood River to Ketchum 138kV Line for Wind, Ice and Avalanche Loading." Idaho Power Company. 1994. (P).
160. "Verification Testing of Light Duty Steel Poles." International Utility Structures, Inc. 1994. (P).
161. "Specification Development for Procurement of Steel Poles." International Utility Structures. 1994. (P).
162. "Evaluation and Assessment of the Condition of the Lower Colorado River Authority and Guadeloupe Valley Electric Cooperative Geronimo and McQueeney Lines." Power Engineers. 1994. (P).
163. "Reliability and Risk Assessment of the Billings to Anaconda 161kV Line." Montana Power Company. 1994. (P).
164. "Inspection and Reliability Assessment of the Booneville to Ashawa Line." Midwest Power Company. 1994. (P).
165. "Quality Control Software Development." National Particle Board Association. 1994. (P).

166. "Investigation of Storm Induced Line Failures at Nebraska Public Power District." Power Engineers. 1994. (PM).
167. "Development of Effective Field Treatment Systems for Wood Members." Oregon State University. 1994. (P).
168. "Evaluation of the Condition and Integrity of Wood Pole Tangent and Deadend Structures." Plains Electric G&T Cooperative. 1994. (P).
169. "Development of Transmission Line Structure Strength Degradation Data for Public Service Company of New Mexico." Power Engineers. 1994. (P).
170. "Evaluation of Wood Pole Utility Lines at Sierra Army Depot." Power Engineers. 1994. (P).
171. "Development of Cross Tie Inspection Technology." Union Pacific Technologies. 1994. (P).
172. "Development of Railroad Cross Tie Disposal Options." Union Pacific Railroad. 1994. (P).
173. "Survey on the Use of Utility Line Crossarms." United States Crossarm Manufacturers Association. 1994. (P).
174. "Destructive Testing of Laminated Wood Poles." Willamette Industries. 1994. (P).
175. "Comparison of the Performance and Economics of Various Types of Utility Line Structures." Western Wood Preservers Institute. 1994. (PM).
176. "Inspection and Assessment of Wood Pole Utility Lines at the Yuma Proving Grounds." U.S. Army – Yuma Proving Grounds. 1994. (P).
177. "345 kV Transmission Line Structural Analysis and Remedial Action Recommendations." Northern States Power. 1994. (PM).
178. "Assistance with Wood Pole Management Program Enhancements." ESBI. 1993. (PM).
179. "Reliability and Risk Assessment of Overhead Transmission Lines." Idaho Power Company. 1993. (PM).
180. "Inspection and Assessment of the Edson to Hinton Transmission Line." TransAlta Utilities. 1992-1993. (PM).

181. "Reliability and Risk Assessment of Overhead Transmission Lines." West Plains Energy. 1993. (P).
182. "Analysis of System Wide Wood Pole Condition." Poudre Valley REA. 1992. (P).
183. "Conductor Analysis Hardware Development." Confidential Client. 1992. (PM).
184. "Customization of the Inspection Data Expert - Facilities Inspection and Management System." Idaho Power Company. 1992. (PM).
185. "Development of a Composite Pole Repair System." Confidential Client. 1992. (PM).
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45. Pandey, A.K., R.W. Anthony, A.H. Stewart, G.M. Light and R. Zoughi, "Feasibility of Using Various Sensor Technologies for Ground Clearance and/or Conductor Tension Monitoring," WO 4013—3, EPRI, Palo Alto, California, 1998.

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2. "Innovative Wood Pole Management Using Nondestructive Strength Testing - EDM Seminar Series," October 1986, Fort Collins, Colorado; September 1987, Atlantic City, New Jersey; April 1987, Tampa, Florida; October 1987, Louisville, Kentucky; April 1987, Irvine, California; October 1987, Kansas City, Missouri; May 1987, Fort Collins, Colorado; April 1988, New York State Electric and Gas, Binghamton, New York.
  - a.) Structural Analysis Methods
  - b.) Conventional Pole Maintenance/Inspection
  - c.) In-Service and New Pole Testing Program
  - d.) Innovative Strength Testing Using NDE
  - e.) Applications of Innovative Structural Analysis and Reliability Methods
  - f.) Economic Benefits of Wood Pole Management
3. Northeast Transmission Group Meeting. May 1987. "NDE in Wood Pole Management," Hyannis, Massachusetts.

5. Western Wood Preservers Institute Mini Seminar Series. January 1988-1990. "Economics of Wood Pole Structures for Lifetime Performance." Presented to more than 500 utility engineers throughout the United States.
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26. EPRI Sponsored Workshop – Assessment and Inspection Methods for Overhead Transmission Lines. April 1995. Speaker on Various Topics. Boise, Idaho.
27. Houston Lighting and Power – Assessment and Inspection Methods Workshop for Overhead Transmission and Distribution Lines. August 1995. Speaker on Various Topics. Houston, Texas.
28. International Conference on Wood Poles and Piles. March 1996. "Wood Utility Poles: How Long Do They Really Last?" Fort Collins, Colorado.
29. Idaho Power Company – Line Assessment and Inspection Workshop. July 1996. Speaker on Various Topics. Boise, Idaho.
30. Inspection, Assessment and Restoration of Overhead Lines – A Power Systems Professional Course by BH Engineering Systems Limited. May and October 1996. Lecturer on Various Topics. Queens County, Nova Scotia and Calgary, Alberta.



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48. Southeast Electric Exchange Conference. June 1999. "Performance Measurement for Transmission Lines in California." Atlanta, Georgia.
49. 9<sup>th</sup> International Conference on Transmission & Distribution Construction, Operation & Live-Line Maintenance. October 2000. "Panel Session: Data Collection and Management Methods for Transmission Line Assets." Montreal, Quebec, Canada.
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51. New Mexico Supervisors Association Meeting. 2000. "New Solutions for Bird Electrocution and Collision Problems." Albuquerque, New Mexico.
52. EUCI Engineering and Planning for Aging T&D Infrastructure Conference. 2001. "Technology Solutions for Inspection, Assessment and Maintenance of Overhead Lines." Denver, Colorado.
53. Southeastern Electric Exchange - 2001 A Utility Odyssey – Conference and Trade Show. 2001. "Reliability Centered Maintenance (RCM) of Wood Pole Lines." Miami, Florida.
54. CEA Workshop on the Inspection and Maintenance of Overhead Lines. 2002. "Corrosion Detection – An Emerging Problem in Buried Steel Structures." Winnipeg, Manitoba, Canada.

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59. T&D World Expo Conference and Trade Show. 2002. "Solutions for Inspecting, Assessing and Maintaining Overhead Lines Constructed on Wood Poles." Atlanta, Georgia.
60. OFIL DayCorII User's Group Meeting. 2002. "Visual Inspection Methods: Capabilities, Limitations and Opportunities for Improvement." Atlanta, Georgia.
61. Northeast Utility Pole Conference. October 2002. "The Structure of Tomorrow's Utility -- A View of Things to Come." Binghamton, New York.
62. 10<sup>th</sup> International Conference on Transmission & Distribution Construction, Operation & Live-Line Maintenance. April 2003. "Panel Session: Utility Monitoring and Tracking Systems for Outages and Maintenance of Transmission Lines." Orlando, Florida.
63. EPRI Inspection and Assessment of Overhead Transmission Line Equipment – Workshop and Utility Paper Session. May 2003. Monterey, California. Instructor on the following topics:
  - a.) Considerations for Establishing and Refining Inspection and Assessment Processes
  - b.) Why Inspect and Maintain Overhead Lines?
  - c.) Visual Inspection Methods: Capabilities and Limitations
  - d.) Visual Inspection Methods: Opportunities for Improvement
  - e.) Periodicity/Frequency of Inspections
  - f.) Asset Management – What is it?
  - g.) Performance Metrics

64. EPRI Increase Power Flow Conference. August 2003. "Development and Application of Sensor Technologies for the Thermal Rating of Overhead Lines." Boston, Massachusetts.
65. NWPPA Utility Pole Structures Conference and Trade Show. November 2003. "Keynote: The State of the Industry". Reno, Nevada.
66. EPRI Overhead Transmission: Equipment Inspection and Maintenance Practices Conference. "Solutions for Inspecting, Assessing and Maintaining Overhead Lines Constructed on Wood Poles." May 2004. Monterey, California.
67. Power Engineers' Annual Transmission Line Design Conference. Speaker on Various Topics. 1989-2004. Sun Valley, Idaho. Topics Include:
  - a.) Structural Analysis Methods
  - b.) Line Inspection and Maintenance
  - c.) Codes and Standards
  - e.) Applications of Innovative Structural Analysis and Reliability Methods
  - f.) Analysis of Meteorological Data for Line Rating
  - g.) Facilities Maintenance Planning and Forecasting
  - h.) Facilities Maintenance in the Deregulated Environment
  - i.) Innovative Methods for Line Rating
  - j.) Wood Transmission Structure Design
  - k.) Optimizing Thermal Ratings
68. EDM International's Annual Workshop on Overhead Line Inspection and Management. Speaker on Various Topics Related to Line Engineering, Inspection and Maintenance, 1989-2004. Fort Collins, Colorado.